

WHAT IS CLAIMED IS:

1. A method for deploying parts, comprising:  
defining a plurality of locations comprising a plurality of supply locations and  
a plurality of demand locations, a supply location being operable to supply a plurality  
of parts to a demand location;  
5 computing a demand for each part at each location;  
estimating an availability lead-time for each part at each location;  
computing a lead-time demand for each part at each location using the  
availability lead-times for the part;  
10 computing a stock level for each part at each location;  
determining a completely filled demand from the lead-time demands and the  
stock levels;  
determining a partially filled demand from the lead-time demands and the  
stock levels; and  
15 generating a coverage function for the parts at the locations from the  
completely filled demand and the partially filled demand.  
  
2. The method of Claim 1, further comprising:  
optimizing the coverage function; and  
20 determining an optimal deployment of the parts at the locations according to  
the optimized coverage function.

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3. The method of Claim 1, further comprising:

determining a completely backordered demand from the lead-time demands and the stock values;

5 determining a partially backordered demand from the lead-time demands and the stock values;

generating a backorder function for the parts at the locations from the completely back ordered demand and the partially backordered demand;

minimizing the backorder function; and

10 determining an optimal deployment of the parts at the locations according to the minimized backorder function.

4. The method of Claim 1, further comprising:

generating a cost function for the parts at the locations;

minimizing the cost function; and

15 determining an optimal deployment of the parts at the locations according to the minimized cost function.

5. The method of Claim 1, wherein computing the lead-time demand for a part at a location comprising a demand location comprises:

20 calculating a probability that a supply location can supply the part to the demand location;

computing a replenishment lead-time at the demand location according to the probability; and

25 computing the lead-time demand at the demand location from the demand at the demand location and the replenishment lead-time at the demand location.

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6. The method of Claim 1, wherein computing the lead-time demand for a part at a location comprises:

receiving an ordered list comprising at least a subset of the supply locations;

repeating the following for each supply location of the ordered list:

5 calculating a probability that a supply location supplies the part to the demand location, given that no other supply location has supplied the part; and

selecting the next supply location of the ordered list; and

estimating the availability lead-time at the location from the calculated probabilities.

7. The method of Claim 1, wherein estimating the availability lead-time for a part at a location comprising a target demand location comprises:

estimating an availability lead-time for the part at a supply endpoint; and

repeating the following until the target demand location is reached:

15 estimating an availability lead-time for the part at a supply location; and  
estimating a replenishment lead-time for the part at a demand location according to the availability lead-time for the part at the supply location, the supply location operable to supply the part to the demand location.

8. The method of Claim 1, wherein computing the demand for a part at a location comprising a supply location comprises:

calculating a demand at a demand location operable to receive the part from the supply location;

25 calculating a dependent demand at the supply location according to the demand at the demand location;

calculating an independent demand at the supply location; and

computing the demand at the supply location from the dependent demand and the independent demand.

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9. The method of Claim 1, wherein computing the demand for a part at a location comprising a supply location comprises:

calculating a demand at a demand location operable to receive the part from the supply location;

5 establishing a probability of repairing the part at the demand location; and

determining the demand at the supply location according to the demand at the demand location and the probability of repairing the part at the demand location.

10. The method of Claim 1, wherein computing the demand for a part at a location comprising a target supply location comprises:

calculating a demand at a demand endpoint; and

repeating the following until the target supply location is reached:

calculating a demand at a demand location; and

15 calculating a demand at a supply location operable to supply the part to the demand location according to the demand at the demand location.

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FOOTNOTES

11. A computer-implemented system for deploying parts, comprising a server associated with one or more software components collectively operable to:

define a plurality of locations comprising a plurality of supply locations and a plurality of demand locations, a supply location being operable to supply a plurality of parts to a demand location;

compute a demand for each part at each location;

estimate an availability lead-time for each part at each location;

compute a lead-time demand for each part at each location using the availability lead-times for the part;

compute a stock level for each part at each location;

determine a completely filled demand from the lead-time demands and the stock levels;

determine a partially filled demand from the lead-time demands and the stock levels; and

generate a coverage function for the parts at the locations from the completely filled demand and the partially filled demand.

12. The system of Claim 11, wherein the one or more software components are further operable to:

optimize the coverage function; and

determine an optimal deployment of the parts at the locations according to the optimized coverage function.

13. The system of Claim 11, wherein the one or more software components are further operable to:

determine a completely backordered demand from the lead-time demands and the stock values;

5 determine a partially backordered demand from the lead-time demands and the stock values;

generate a backorder function for the parts at the locations from the completely back ordered demand and the partially backordered demand;

minimize the backorder function; and

10 determine an optimal deployment of the parts at the locations according to the minimized backorder function.

14. The system of Claim 11, wherein the one or more software components are further operable to:

15 generate a cost function for the parts at the locations;

minimize the cost function; and

determine an optimal deployment of the parts at the locations according to the minimized cost function.

20 15. The system of Claim 11, wherein the one or more software components are operable to compute the lead-time demand for a part at a location comprising a demand location by:

calculating a probability that a supply location can supply the part to the demand location;

25 computing a replenishment lead-time at the demand location according to the probability; and

computing the lead-time demand at the demand location from the demand at the demand location and the replenishment lead-time at the demand location.

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16. The system of Claim 11, wherein the one or more software components are operable to compute the lead-time demand for a part at a location by:

- receiving an ordered list comprising at least a subset of the supply locations;
- repeating the following for each supply location of the ordered list:
- 5 calculating a probability that a supply location supplies the part to the demand location, given that no other supply location has supplied the part; and
- selecting the next supply location of the ordered list; and
- estimating the availability lead-time at the location from the calculated probabilities.

17. The system of Claim 11, wherein the one or more software components are operable to estimate the availability lead-time for a part at a location comprising a target demand location by:

- estimating an availability lead-time for the part at a supply endpoint; and
- 15 repeating the following until the target demand location is reached:
- estimating an availability lead-time for the part at a supply location;
- and
- estimating an replenishment lead-time for the part at a demand location according to the availability lead-time for the part at the supply location, the supply location operable to supply the part to the demand location.

18. The system of Claim 11, wherein the one or more software components are operable to compute the demand for a part at a location comprising a supply location by:

- 25 calculating a demand at a demand location operable to receive the part from the supply location;
- calculating a dependent demand at a location according to the demand at the demand location for the location;
- identifying an independent demand at the supply location; and
- 30 computing the demand at the supply location from the dependent demand and the independent demand.

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19. The system of Claim 11, wherein the one or more software components are operable to compute the demand for a part at a location comprising a supply location by:

5 calculating a demand at a demand location operable to receive the part from the supply location;

establishing a probability of repairing the part at the demand location; and

determining the demand at the supply location according to the demand at the demand location and the probability of repairing the part at the demand location.

10 20. The system of Claim 11, wherein the one or more software components are operable to compute the demand for a part at a location comprising a target supply location by:

calculating a demand at a demand endpoint; and

repeating the following until the target supply location is reached:

15 calculating a demand at a demand location; and  
calculating a demand at a supply location operable to supply the part to the demand location according to the demand at the demand location.

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21. Logic embodied in a computer-readable medium and when executed by a computer operable to:

define a plurality of locations comprising a plurality of supply locations and a plurality of demand locations, a supply location being operable to supply a plurality of parts to a demand location;

compute a demand for each part at each location;

estimate an availability lead-time for each part at each location;

compute a lead-time demand for each part at each location using the availability lead-times for the part;

generate a completely filled demand from the lead-time demands and the stock levels;

generate a partially filled demand from the lead-time demands and the stock levels; and

generate a coverage function for the parts at the locations from the completely filled demand and the partially filled demand.

22. The logic of Claim 21, further operable to:

optimize the coverage function;

determine an optimal deployment of the parts at the locations according to the optimized coverage function; and

compute a stock level for each part at each location.

23. The logic of Claim 21, further operable to:

determine a completely backordered demand from the lead-time demands and the stock values;

5 determine a partially backordered demand from the lead-time demands and the stock values;

generate a backorder function for the parts at the locations from the completely back ordered demand and the partially backordered demand;

minimize the backorder function; and

10 determine an optimal deployment of the parts at the locations according to the minimized backorder function.

24. The logic of Claim 21, further operable to:

generate a cost function for the parts at the locations;

minimize the cost function; and

15 determine an optimal deployment of the parts at the locations according to the minimized cost function.

25. The logic of Claim 21, wherein the logic is operable to compute the lead-time demand for a part at a location comprising a demand location by:

20 calculating a probability that a supply location can supply the part to the demand location;

computing a replenishment lead-time at the demand location according to the probability; and

25 computing the lead-time demand at the demand location from the demand at the demand location and the replenishment lead-time at the demand location.

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26. The logic of Claim 21, wherein the logic is operable to compute the lead-time demand for a part at a location by:

receiving an ordered list comprising at least a subset of the supply locations;

repeating the following for each supply location of the ordered list:

5 calculating a probability that a supply location supplies the part to the demand location, given that no other supply location has supplied the part; and

selecting the next supply location of the ordered list; and

estimating the availability lead-time at the location from the calculated probabilities.

27. The logic of Claim 21, wherein the logic is operable to estimate the availability lead-time for a part at a location comprising a target demand location by:

estimating an availability lead-time for the part at a supply endpoint; and

repeating the following until the target demand location is reached:

15 estimating an availability lead-time for the part at a supply location; and

estimating an replenishment lead-time for the part at a demand location according to the availability lead-time for the part at the supply location, the supply location operable to supply the part to the demand location.

28. The logic of Claim 21, wherein the logic is operable to compute the demand for a part at a location comprising a supply location by:

calculating a demand at a demand location operable to receive the part from the supply location;

25 calculating a dependent demand at the supply location according to the demand at the demand location;

calculating an independent demand at the supply location; and

computing the demand at the supply location from the dependent demand and the independent demand.

29. The logic of Claim 21, wherein the logic is operable to compute the demand for a part at a location comprising a supply location by:

calculating a demand at a demand location operable to receive the part from the supply location;

5 establishing a probability of repairing the part at the demand location; and

determining the demand at a location according to the demand at the demand location for the location and the probability of repairing the part at the demand location.

10 30. The logic of Claim 21, wherein the logic is operable to compute the demand for a part at a location comprising a target supply location by:

calculating a demand at a demand endpoint; and

repeating the following until the target supply location is reached:

calculating a demand at a demand location; and

15 calculating a demand at a supply location operable to supply the part to the demand location according to the demand at the demand location.

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31. A system for deploying parts, comprising:

means for defining a plurality of locations comprising a plurality of supply locations and a plurality of demand locations, a supply location being operable to supply a plurality of parts to a demand location;

5 means for computing a demand for each part at each location;

means for estimating an availability lead-time for each part at each location;

means for computing a lead-time demand for each part at each location using the availability lead-times for the part;

10 means for generating a completely filled demand from the lead-time demands and the stock levels to be determined as a result of an optimization;

means for generating a partially filled demand from the lead-time demands and the stock levels; and

means for generating a coverage function for the parts at the locations from the completely filled demand and the partially filled demand.

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32. A method for deploying parts, comprising:

defining a plurality of locations comprising a plurality of supply locations and a plurality of demand locations, a supply location being operable to supply a part to a demand location;

5        computing a demand for the part at each location by calculating a demand at a demand location operable to receive the part from a supply location, calculating a dependent demand at the supply location according to the demand at the demand location, calculating an independent demand at the supply location, and computing the demand at the supply location from the dependent demand and the independent demand;

10        estimating a lead-time demand of the part at each location by receiving an ordered list comprising at least a subset of the supply locations, and repeating the following for each supply location of the ordered list:

15            calculating a probability that a supply location supplies the part to the demand location, given that no other supply location has supplied the part; and

          selecting the next supply location of the ordered list;

          estimating the lead-time demand at the demand location from the calculated probabilities;

20        generating a completely filled demand from the demands and the lead-time demands;

          generating a partially filled demand from the demands and the lead-time demands;

25        generating a coverage function for the part at the locations from the completely filled demand and the partially filled demand, the coverage function describing an expected backorder of the part at the locations;

          minimizing the coverage function; and

          determining an optimal deployment of the part at the locations according to the minimized coverage function.

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